December 22nd, 2022

Department of Natural Resources: European Green Crab Work Plan

EUROPEAN GREEN CRAB IN WASHINGTON

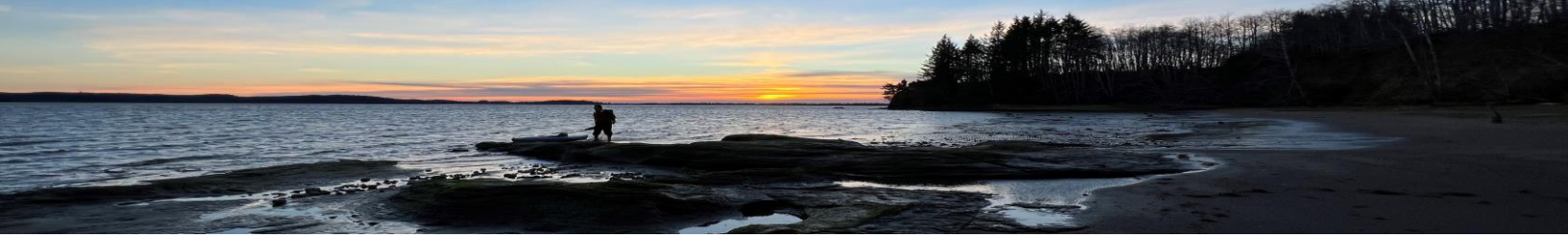
On January 19, 2022, Governor Jay Inslee issued an emergency proclamation and ordered the Washington Department of Fish and Wildlife (WDFW) to implement emergency measures "as necessary to affect the eradication of or to prevent the permanent establishment and expansion of European green crab (EGC)." DNR was requested to identify EGC as a high priority and facilitate implementation of emergency measures on state-owned aquatic lands.

Under "Task 2" of Project #: 22-1970/DNR #93-10407 "Statement of Work", DNR's "ECG Coordinators, in collaboration with RCO, WDFW, WA Sea Grant, and other affected programs and stakeholders, shall develop 2023 spring/summer EGC work plans by the end of March 2023".

Figure 1. Two European green crab molts found at Hawks Pt. in Willapa Bay. Photo taken by Alexa Brown

As stated in the emergency proclamation 20-02: If European green crab *"become permanently established in the coastal waters of Washington State, it is likely that European green crabs will become predators to shellfish and juvenile Dungeness crab, destroy critical habitat such as eelgrass beds and estuarine marshes, disrupt natural food webs, harm overall crab populations, hinder salmon and Southern Resident killer whale recovery efforts, reduce shorebird food supplies, and ultimately affect the overall health and resiliency of the Salish Sea"*

This underscores the importance of establishing a strong work plan.



Mission: ***Support nearshore habitat ecological well-being and fisheries economy by trapping, monitoring and researching European green crab along the coast and in Salish Sea.***

Goals for the Coast

- Prioritize and perform, primarily, control and assessment trapping at DNR Natural Area Preserves and Natural Resource Conservation Areas where there is suitable EGC habitat and/or high risk habitats to functionally control EGC on these lands
- Perform control trapping in areas where EGC populations have previously been detected
- Prospect new trapping locations to find previously undetected populations and detect possible "hot spots"
- Be able to respond quickly when a previously undetected population is found and conduct / assist in control trapping
- Conduct assessment trapping at ANeMoNe sites to track effects of EGC on eelgrass beds where there is suitable EGC habitat
- Coordinate all efforts with agencies and groups conducting similar work in the same water bodies

Goals for the Salish Sea

- Perform assessment trapping on DNR aquatic lands, prioritizing areas on or adjacent to Aquatic Reserves (AR) as well as DNR Natural Areas (Natural Area Preserves and Natural Resource Conservation Areas) where there is suitable EGC habitat and/or high risk habitats to functionally control EGC on these lands.
- Continue to monitor 2 WSG Crab Team sites on Aquatic Reserves to contribute to long-term monitoring dataset (Nisqually Reach AR – Anderson Island & Cypress Island AR).
- Assist in the planning and execution of large-scale assessment or control efforts with regional partners on strategic aquatic lands (e.g. Fidalgo Bay Trapping Blitz).
- Develop EGC trapping programs and schedules with Aquatic Reserve Citizen Stewardship Committees (CSCs) where feasible, supporting and engaging local communities.
- Conduct outreach and education events with coordination from CSCs and EGC partners, highlighting AIS and the stewardship of Aquatic Reserves.
- Be able to respond quickly when a previously undetected population is found and conduct / assist in rapid response trapping.

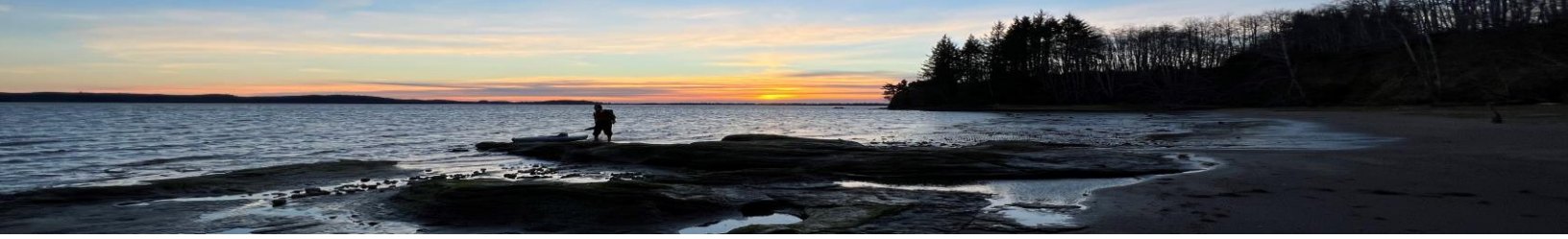
Priorities for the Coast

Short Term

- Receive AIS permit from WDFW and work through ESA permitting process for Salish Sea region.
- We will be prioritizing EGC trapping as follows:
  1. Natural Areas Preserves and Natural Resource Conservation Areas with suitable EGC habitat
  2. Public aquatic lands where "hot spots" have been detected or nearby
  3. ANeMoNe sites in Willapa and Grays Harbor
  4. Other public lands

Long Term

- Create a framework to identify DNR lands that would benefit from intensive EGC trapping to functionally control local populations (e.g. sensitive habitats, priority species and economic impact).



- Identify metrics and set standards to inform trapping intensity at any given location (e.g., CPUE). This is a broader conversation among all state trapping partners.

Priorities for the Salish Sea

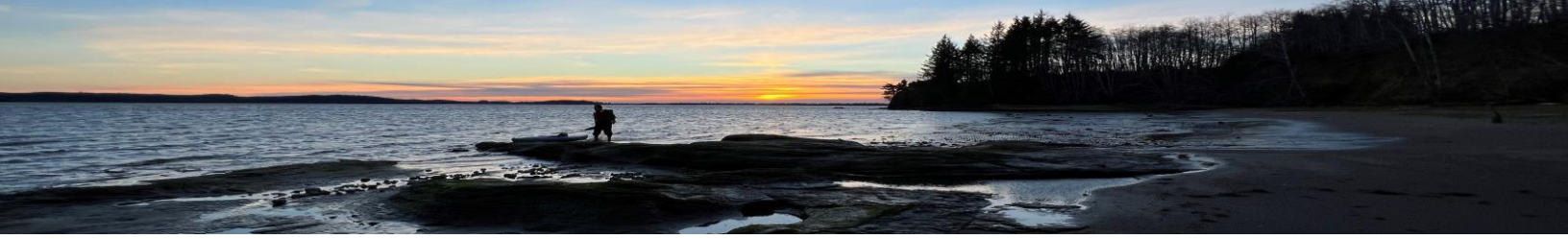
Short Term

- Receive ESA Section 10(a)(1)(A) permit for scientific take of ESA-listed species
- Perform EGC trapping, which will be prioritized as follows:
  1. Existing WSG Crab Team sentinel sites
  2. Aquatic Reserves, Natural Areas, and Natural Resource Conservation Areas with suitable EGC habitat
  3. Aquatic lands with or nearby previous detections of EGC
- Participate in and encourage partners/volunteers to perform WA Sea Grant's Molt Survey program

Long Term

- Co-locate trapping with ANeMoNe sites and gather correlated data
- Identify metrics and set standards to inform trapping intensity at any given location (e.g. CPUE). This is a broader conversation among all state trapping partners.
- Develop strategies to respond quickly when there are new detections of EGC within the Salish Sea.
- Develop a monitoring framework with DNR land stewards (lessees, CSCs, Nature Centers) to regularly conduct EGC trapping as an early detection network.

Figure 2. Dungeness crab molt (left) next to a EGC molt (right), taken at Hawks Point in Willapa Bay. Photo taken by Alexa Brown



Coastal Trapping Locations in Order of Priority

Grays Harbor:
First year, focus on:

1. North Bay Natural Area Preserve (NAP) and Campbell Slough: Access via Burrows Rd or Humptulips boat launch off of 109
2. Elk River: Access via Johns River boat launch or Westport boat launch
3. Grays Harbor National Wildlife Refuge: Access via 28th Street boat launch
4. Grays Harbor ANeMoNe Site: Access via walk in from Bray's Oysters
5. Johns River: Access via Johns River boat launch (working with WDFW when needed to address any "hot spot" flare ups)

Second year, expand to (these sites will also be substituted if catches are low in year one priority sites):

6. Grass Creek: Access via Humptulips boat launch off of 109
7. Westport Winery: Access via South Arbor Road, behind Westport Winery
8. Grass Island: Access via Westport boat launch
9. Grays Harbor Audubon North Bay property by Campbell slough: Access via Burrows Rd
10. Chehalis Surge Plain: Access via Montesano or Cosmopolis boat launches (only to assess presence)

Grays Harbor

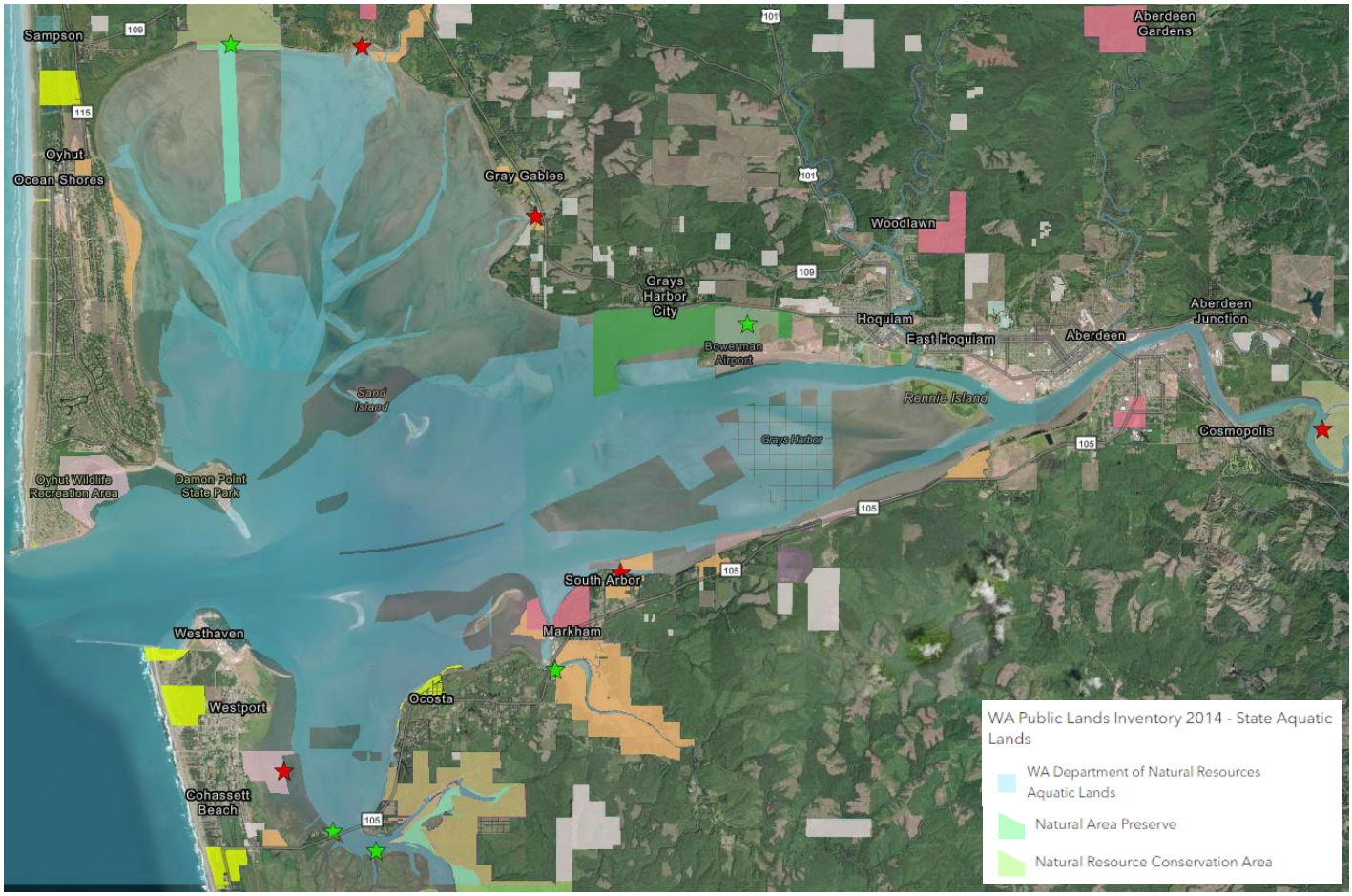
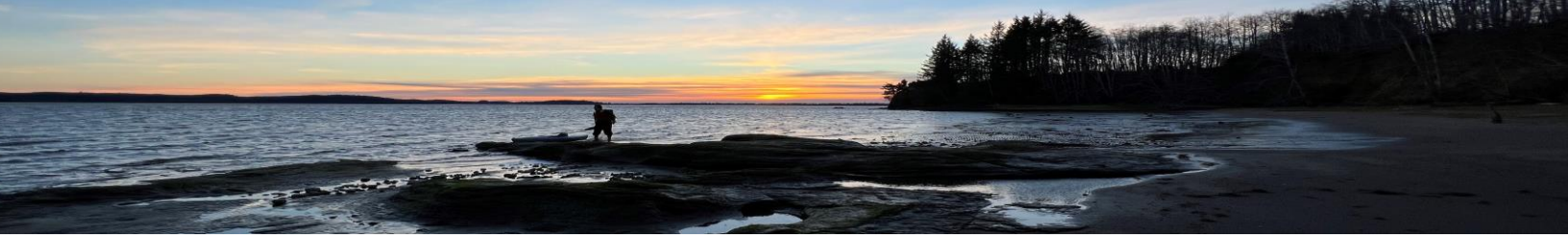


Figure 3. Trapping locations identified for year one focus are marked with a green star, all others marked with red stars



Coastal Trapping Locations in Order of Priority

Willapa Bay:

First Year, focus on:

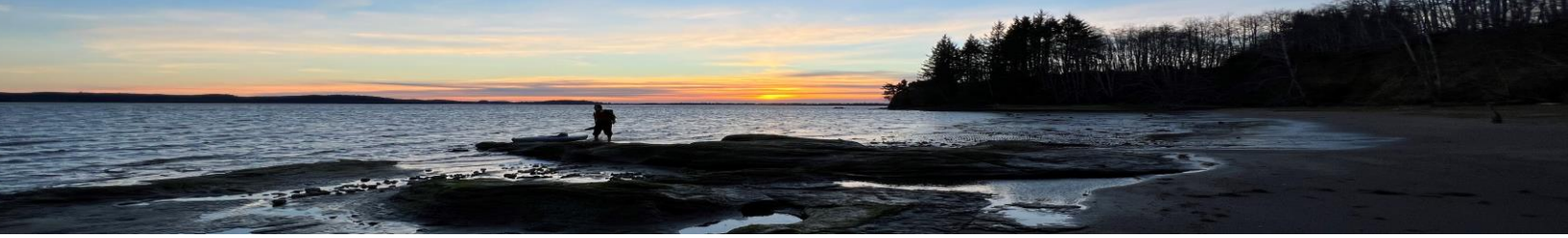
1. Bone River Natural Area Preserve (NAP): Access via Palix boat launch and walk-in from road
2. Niawiakum River NAP: Access via Palix River boat launch
3. Palix River: Access via Palix River boat launch and walk-in from road
4. Willapa Bay ANeMoNe site: Access via walk in at WDFW office in Nacotta

Second year, expand to (these sites will also be substituted if catches are low in year one priority sites):

5. Sandy Point: Access via Palix River boat launch and walk in from Bay Center Road
6. Pickernell Creek to Nemah River: Access via Willapa National Wildlife Refuge boat launch
7. Naselle River: Access via Willapa National Wildlife Refuge boat launch

Willapa Bay

Figure 4. Trapping locations identified for year one focus are marked with a green star, all others marked with red stars



Coastal Trapping Locations in Order of Priority

Columbia River
First year, focus on:

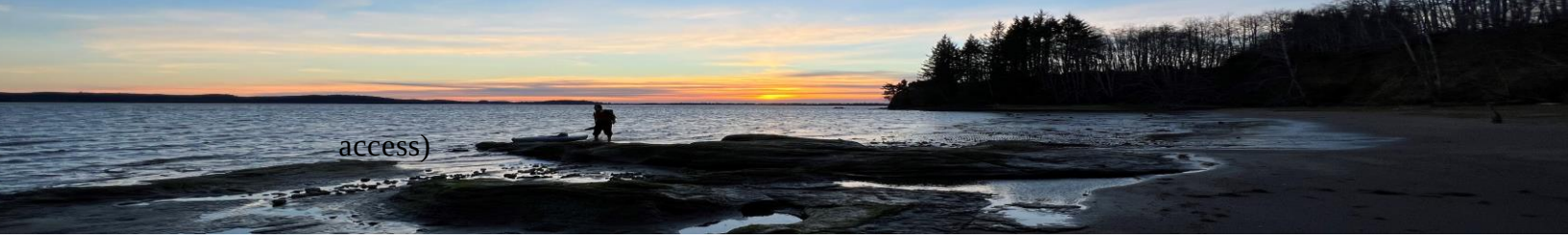
1. Baker Bay: Access via Ilwaco boat launch

Columbia River

Figure 5. Trapping locations marked with red stars

Salish Sea Trapping Locations in Order of Priority

1. Crab Team sites: Cypress Island (AR) and Anderson Island (Nisqually Reach AR)
2. Fidalgo Bay AR Bio-Blitz – large scale assessment trapping with the help of regional partners and co-managers
3. Aquatic Reserves:
    a. Cherry Point AR – trapping by boat in subtidal area; shore-based trapping in pocket estuaries
    b. Whidbey Island west shore – Smith & Minor AR + various State Parks; trapping by boat in subtidal area; shore-based trapping in pocket estuaries (walk-in/boat access)
    c. Travis Spit / Gibson Spit – Protection Island AR (adjacent) trapping in lagoons (boat



access)

   d. Quartermaster Harbor – Maury Island AR shore-based trapping in harbors (walk-in/boat access)
   e. Nisqually NWR – Nisqually Reach AR (adjacent) walk-in trapping
4. Lummi Island NRCA - shore-based & subtidal trapping; access via boat (boat access/ walk-in)
5. Hood Canal aquatic lands:
   a. Dabob Bay NAP/NRCA – shore-based & subtidal trapping; access via boat (boat access/limited walk-in)
   b. Stavis NRCA + nearby county parks – shore-based & subtidal trapping (boat access/limited walk-in)
6. Partner-assisted efforts
   a. Birch Bay (assist NWSC) – walk-in/boat access
   b. Skagit Bay (assist NWSC / Swinomish Tribe) – boat access
   c. Henry Island / Roche Harbor (assist WDFW) – boat access
   d. Discovery Bay + Sequim Bay (Jamestown S'Klallam Tribe)
7. Other aquatic lands / state parks
   a. Woodard Bay NRCA + Henderson Inlet (S Sound) – walk-in/boat access
   b. Potlatch State Park – walk-in (possible assist with Skokomish Tribe)
   c. Port Gamble – walk-in/boat access (possible assist with Port Gamble S'Klallam Tribe)a

Salish Sea

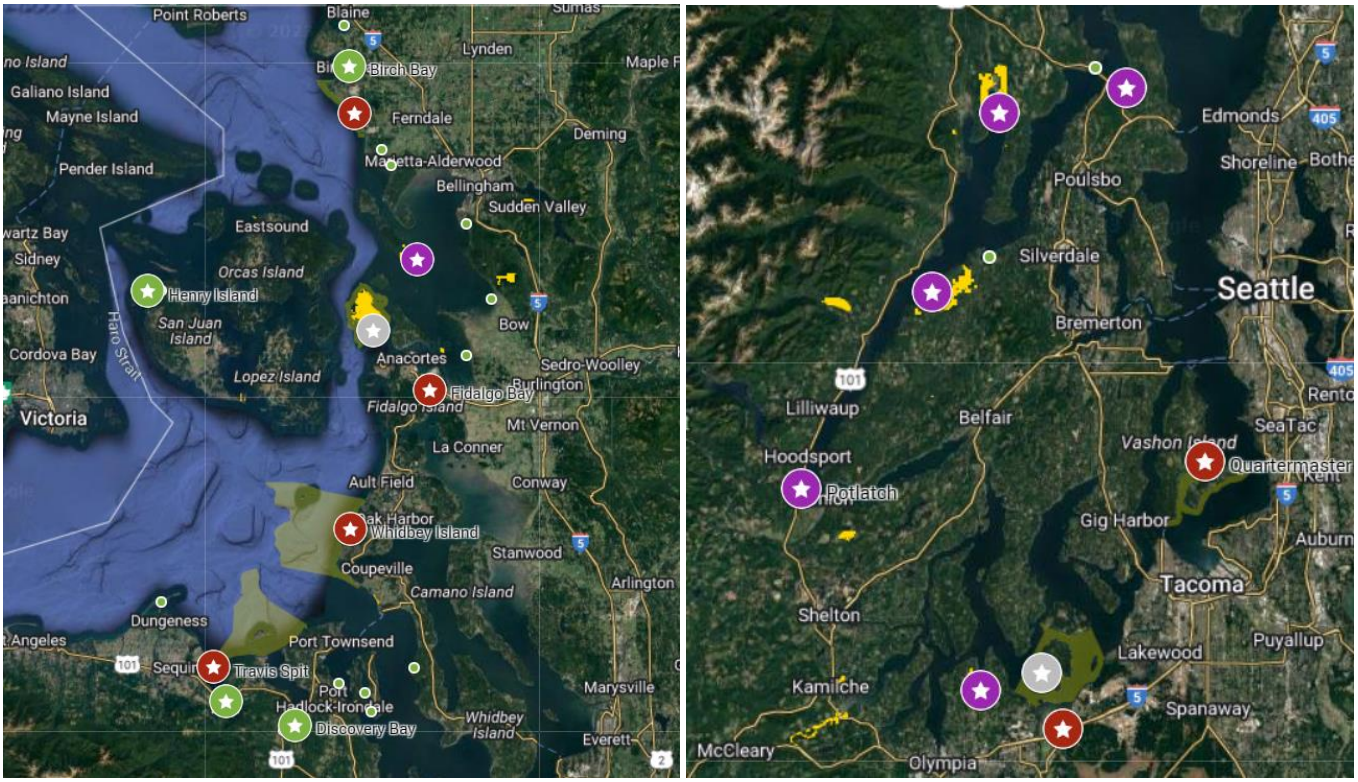
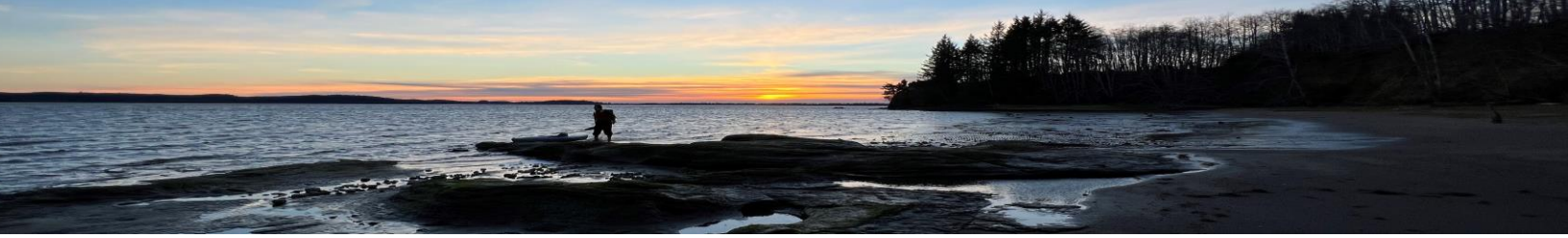


Figure 6. Salish Sea trapping locations, with red stars as highest priority, green stars are assessments and purple stars are lowest priority

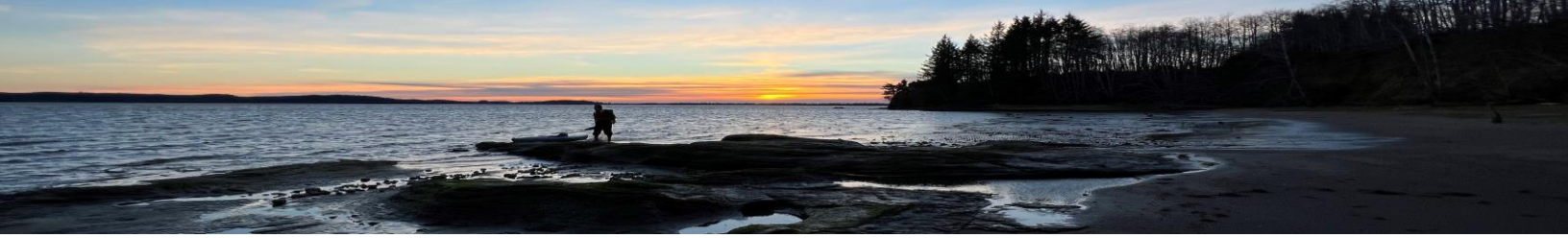


Type and Timing of Trapping: Coast, year 1

- Natural Areas and Natural Resources Conservation Areas: control trapping with shrimp (minnow's when young of the year are being caught) pots monthly and once a year assessment trapping (shrimp, Fukui, and minnow traps) with at the minimum of a 2-day soak with trap checks every 24 hours
- Other DNR lands: control trapping with 2-day soak with trap checks every 24 hours
- ANeMoNe sites: assessment trapping twice a year with a 2-day soak, trap checks every 24 hours
- Fill in with other sites as time and weather allows flexibility to switch to other sites when catches are low in one of the priority sites

Site Name	Site Type	Trapping Protocol	Frequency	Trap Duration	Trap Types	# of Traps	Months
North Bay	NAP	Assessment	1x/year	2-night soak**	M, F, S	80-100	June
North Bay	NAP	Control	1x/month	2-night soak**	S, M*	30-50	Year round
Elk River	NAP/NRCA	Assessment	1x/year	2-night soak**	M, F, S	80-100	June
Elk River	NAP/NRCA	Control	1x/month	2-night soak**	S, M*	30-50	Year round
Johns River	Public Land	Control	1x/bi-monthly	2-night soak**	S, M*	30-50	Year round
Grays Harbor	NWR	Assessment	4x/year	2-night soak**	M, F, S	80-100	March, June, September, December
Grays Harbor	ANeMoNe	Assessment	2x/year	2-night soak**	M, F, S	80-100	May, September
Bone River	NAP/NRCA	Assessment	1x/year	2-night soak**	M, F, S	80-100	June
Bone River	NAP/NRCA	Control	1x/month	2-night soak**	S, M*	30-50	Year round
Niawiakum River	NAP/NRCA	Assessment	1x/year	2-night soak**	M, F, S	80-100	June
Niawiakum River	NAP/NRCA	Control	1x/month	2-night soak**	S, M*	30-50	Year round
Palix River	Public Lands	Prospecting	2x/year	2-night soak**	M, F, S	30-50	July, October
Palix River	Public Lands	Control	1x/bi-monthly	2-night soak**	S, M*	30-50	Year round
Willapa Bay	ANeMoNe	Assessment	2x/year	2-night soak**	M, F, S	80-100	May, September
Baker Bay	Public Lands	Prospecting	2x/year	2-night soak**	M, F, S	80-100	July, October

*When young of the year are being caught, closer to mouths of the bay
** Minimum soak time
M=Minnow trap, F=Fukui trap, and S=Shrimp pot



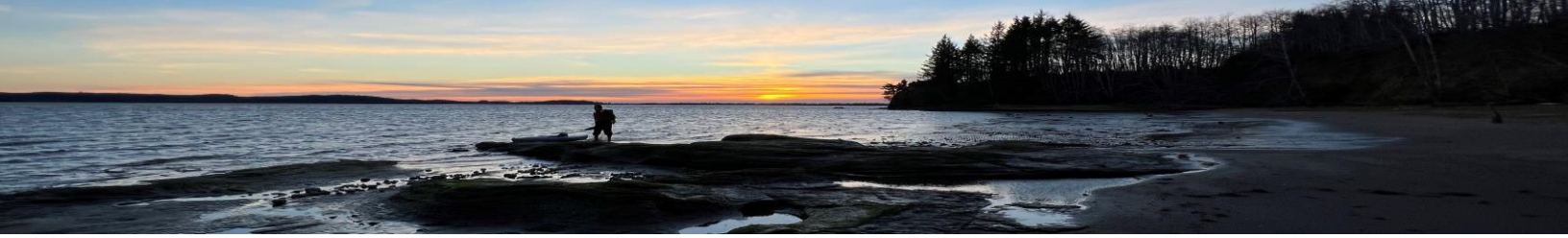
Type and Timing of Trapping: Salish Sea year 1

Site Name	Site Type	Trapping Protocol	Frequency	Trap Duration	Trap Types	# of Traps	Months
Nisqually NWR	USFWR / Reserve adjacent	Prospecting	1x/year	1-night soak	F, M		April
Cherry Point	Aquatic Reserve	Prospecting	1x/year	1-night soak*	S, F, M		
Fidalgo Bay	Aquatic Reserve	Prospecting	1x/year	2-night soak	S, F, M		
Travis Spit	Aquatic Reserve / Reserve adjacent	Prospecting	1x/year	1-night soak*	S, F, M		
Whidbey Island	Aquatic Reserve / Reserve adjacent	Prospecting	1x/year	1-night soak*	S, F, M		
Maury Island	Aquatic Reserve	Prospecting	1x/year	1-night soak*	S, F, M		
Birch Bay	Private lands (assist NWSC)	Assessment	1-3x/year	2-night soak	F, M		
Henry Island	Parks / Public lands (assist DFW)	Assessment	1x/year	2-night soak	S, F, M		
Discovery/ Sequim Bays	Tribal land (assist JS Tribe)	Assessment	1-3x/year	2-night soak	S, F, M		
Dabob Bay	NRCA / NAP	Prospecting	1x/year	1-night soak*	S, F, M		
Stavis Creek	NRCA	Prospecting	1x/year	1-night soak*	S, F, M		

* Minimum soak time
M=Minnow trap, F=Fukui trap, and S=Shrimp pot

Collaborators and Partner Roles

- WDFW and Washington Sea Grant will work with DNR on permitting and training, respectively, DNR will provide data collection, reporting and assistance with boats
- DNR will coordinate timing of trapping with other agencies and groups working in the same water bodies to ensure that activities do not conflict
- Pacific County Weed Management/Pacific Conservation District will supply our first 20 shrimp pots and partner with us on trapping in Willapa Bay as needed
- Pacific Gro will take our frozen crabs to turn them into fertilizer
- WDFW will host a parking spot for a work vehicle and boat in Montesano, WA
- USFW will provide shop space for boat, freezers, traps, and washing station at their Bowerman Basin location, in exchange for one trapping effort a season on the refuge.
- DNR participation in WISC with Blain Reeves as Chair
- DNR participation in MAC group collaboration, Blain Reeves attends regularly with Alexa Brown as his alternate

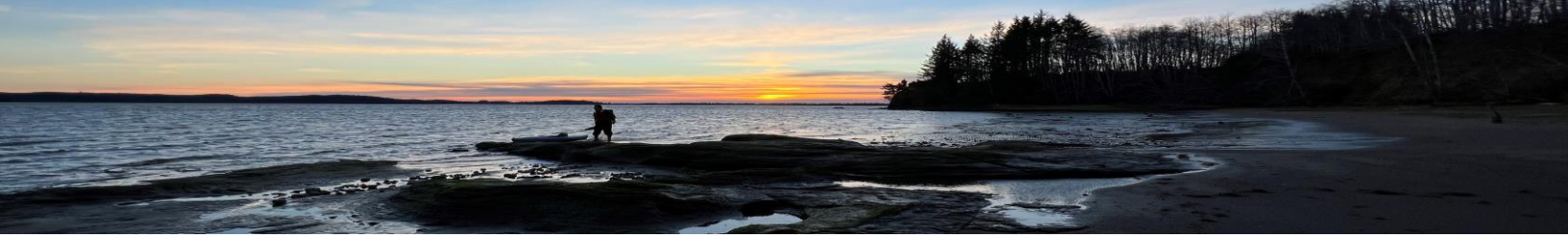


- Puget Sound Corps and various partners/co-managers will help with trapping efforts in the Salish Sea area, including NW Straits Commission, WDFW, interested Tribal entities and Community Stewardship volunteers

Who, What, When, and Where (Coast)

Location	Partners	Delivery Type	Trap Types	Trap Methods
Baker Bay	WDFW	Airboat	S, F, M	Control/Prospecting
Bone River NAP	WDFW, Pacific County	Airboat/Walk in	S, F, M	Control/Assessment
Chehalis River Surge Plain NAP	WDFW	Airboat	S	Control/Prospecting
Elk River NRCA	WDFW	Airboat	S, F, M	Control/Assessment
Grass Creek	WDFW	Airboat	S, F, M	Prospecting/Assessment
Grass Island	WDFW	Airboat	S, F, M	Prospecting/Assessment
Grays Harbor AMeMoNe Site	ANeMoNe team at DNR	Walk in	S, F, M	Assessment
Grays Harbor National Wildlife Refuge	USFWS	Airboat	S, F, M	Control/Assessment
Johns River	WDFW	Airboat/Walk in	S, M*	Control
Niawiakum River NAP	WDFW, Pacific County	Airboat	S, F, M	Control/Assessment
North Bay NAP	WDFW	Airboat/Walk in	S, F, M	Control/Assessment
Palix River	WDFW, Pacific County	Airboat/Walk in	S, F, M	Control/Prospecting
Pickernell Creek to Naselle River	WDFW, Pacific County	Airboat	S, F, M	Prospecting/Assessment
Sandy Point	WDFW, Pacific County	Airboat	S, F, M	Prospecting/Assessment
Westport Winery	WDFW	Walk in	S, F, M	Prospecting
Willapa Bay ANeMoNe Site	ANeMoNe team at DNR	Walk in	S, F, M	Assessment

*When young of the year are being caught
M=Minnow trap, F=Fukui trap, and S=Shrimp pot

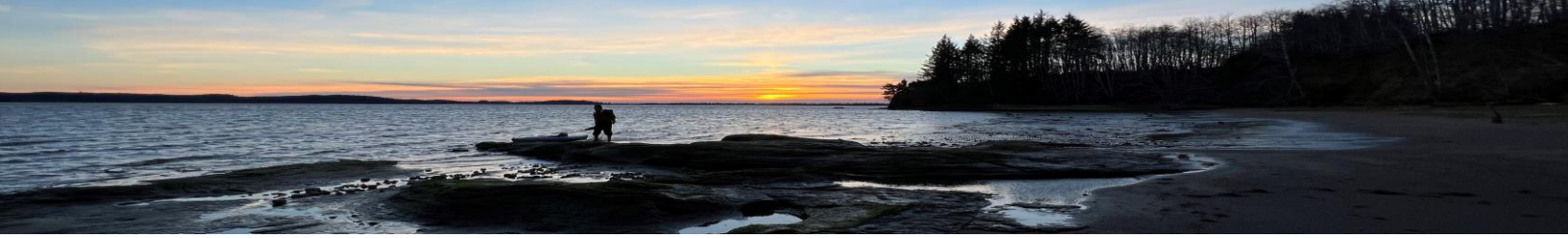


Who, What, When, and Where (Salish Sea)

Location	Partners	Delivery Type	Trap Types	Trapping Methods
Nisqually NWR	PSC	Walk-in	F, M	Prospecting
Cherry Point	PSC	Landing craft/Walk in	S, F, M	Prospecting
Fidalgo Bay	PSC, NWSC, WDFW, Padilla Bay NERR, Jamestown S'Klallam Tribe	Landing craft/Walk in	S, F, M	Prospecting
Travis Spit	PSC	Landing craft	S, F, M	Prospecting
Whidbey Island	PSC	Landing craft/Walk in	S, F, M	Prospecting
Maury Island	PSC	Landing craft	S, F, M	Prospecting
Birch Bay	NWSC	Walk-in	F, M	Assessment
Henry Island	WDFW	Landing craft	S, F, M	Assessment
Discovery/ Sequim Bays	Jamestown S'Klallam Tribe	Landing craft/Walk in	S, F, M	Assessment
Dabob Bay	WDFW?	Landing craft/Walk in	S, F, M	Prospecting
Stavis Creek	WDFW?	Landing craft/Walk in	S, F, M	Prospecting
M=Minnow trap, F=Fukui trap, and S=Shrimp pot				

Trapping Activity Classification

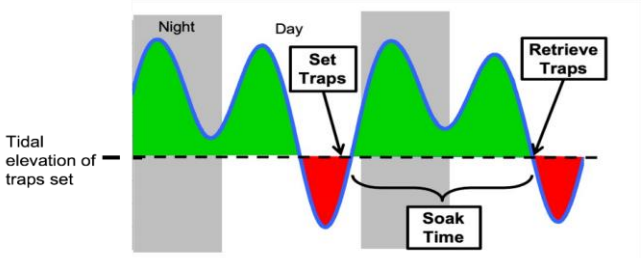
- **Training** – means field training of personnel in EGC trapping and data collection methods.
- **Rapid response** - means expedited management actions triggered when EGC are first detected in a new area for the time-sensitive purpose of determining scope of invasion and containing or eradicating EGC before it spreads or becomes further established.
- **Prospecting** – means a form of early detection where a roving crew generally conducts EGC trapping in a selected Coordination Area or single Site using a larger number (50-100 traps) of traps over 2-3 trap days.
- **Control** - means to stop or slow EGC growth in number or size, to prevent the maturation and spread, and/or to reduce the number of a species or the population of EGC in a Coordination Area or Site (we will predominately use shrimp traps with Fukui and minnow interspersed to catch all age classes (50-100 traps)). These will consist of 2-3 trap days.
- **Assessment** – means periodically checking positive detection EGC areas after initial response to assess if population remains below control management levels. We will use an even number of shrimp, Fukui, and minnow traps and these efforts will consist of 2-3 trap days.



Methods for Trapping

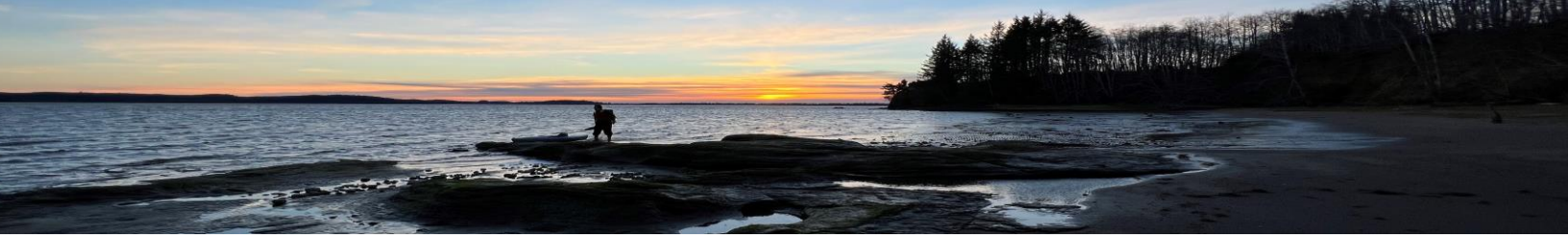
Targeting EGC:

- Green crabs forage at night, so time your trap sets to always soak overnight.
- Set traps around daytime lower low tide and leave for overnight high tide soak (see graphic below).
- Set traps near structure (within 20 meters or 65 feet) if possible.
- Set traps at least 10 meters (30 feet) apart for different trap types, or 20 meters (65 feet) for the same trap type, to avoid trap interference.
- Situate traps so that they can be entered by crabs. Avoid obstructing trap openings with rocks or banks, and take care to ensure trap opening "ramps" are making contact with the substrate (for Fukui traps).
- Pin trap securely to substrate using stakes and/or weights. Crabs are reluctant to enter unstable traps.
- Never dispose of used bait on-site. This will only work to attract and feed green crab.



Reducing habitat/environmental damage:

- Traps must be checked at least once every 24 hours to release native bycatch and reduce mortality.
- Consider water temperature and levels when timing retrieval to reduce bycatch mortality.
- Set traps in natural shallow depressions that hold water or create a shallow depression where you set traps to hold water to protect bycatch.
- Traps should be at least 50% submerged during entire deployment, if possible. You may need to create a shallow depression (as described above) to retain water.
- Shrimp pots should never be fully exposed. Use this trap type only if it will remain mostly submerged while deployed.
- Always stake down Fukui and minnow traps to avoid trap loss due to currents.
- Shrimp pots are outfitted with rebar but may require staking in high-energy zones.
- Use extra weight and PVC stake in higher-energy or open tide flat areas to reduce potential for trap loss.
- Avoid high flow/scour areas, or steep slopes to reduce potential for trap loss.
- Release native animals in cool, protected water to aid recovery/survival. Avoid attracting other predators that may opportunistically prey on released animals. Be mindful of how long animals may be in shallow/warm water until tide re-inundates.
- Be aware of trampling damage to sensitive areas, particularly where repeated trapping will occur. Sensitive habitats may recover very slowly.



"Keeping Clean" Policy and Procedures

Please refer to decontamination protocols outlined in: Invasive Species Management Protocols (Version 4) (wa.gov)

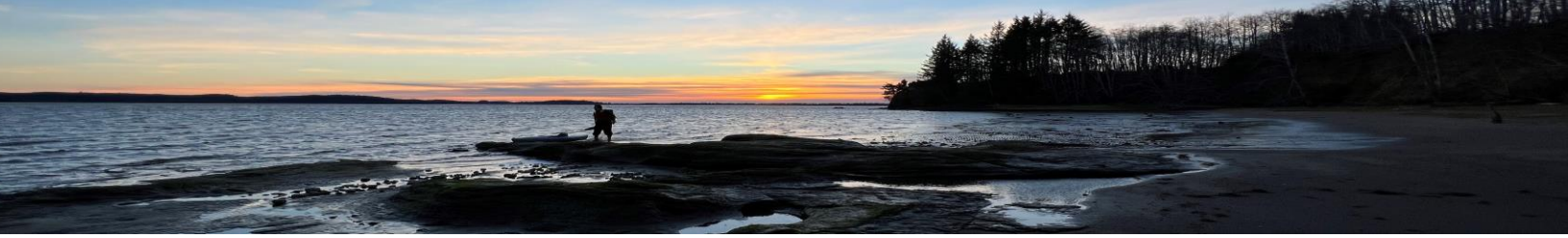
Data Parameters and Sharing

Our data will be reported to the MAC group through Summary Report forms and shared directly with WDFW as needed. Later, this data may be shared with the public through a dashboard/story map. Our data collection will be done through a DNR created app until the WDFW one becomes live.

Control Trapping	Assessment Trapping	Prosect Trapping
Trap type	Trap type	Trap type
Number of Females	Number of Females	Number of Females
Number of males	Number of males	Number of males
Number of gravid females	Number of gravid females	Number of gravid females
Trap location	Trap location	Trap location
Trap number	Trap number	Trap number
Carapace size	Carapace size	Carapace size
	Bycatch	Bycatch

"Helping Hands" List

Name	Organization	Email
Todd Brownlee	DNR	TODD.BROWNLEE@dnr.wa.gov
Natalie Otto	GHCD	natalie.otto@graysharborcd.org
Alex Stote	Sea Grant	stote@uw.edu
Ross Martin	WDFW	Ross.Martin@dfw.wa.gov
Ryan Munes	USFWS	ryan_munes@fws.gov
Kyle Deerkop	Pacific Seafood	Kdeerkop@pacseafood.com
Natalie Sahli	DNR	Natalie.Sahli@dnr.wa.gov
Hannah Robinson	WDFW	Hannah.robbinson@dfw.wa.gov
Ed Darcher	Pacific County	edarcher@co.pacific.wa.us
Seth Flemetis	Pacific County	srflemetis@co.pacific.wa.us
Blaine Reeves	DNR	BLAIN.REEVES@dnr.wa.gov
Todd Palzer	DNR	TODD.PALZER@dnr.wa.gov
Anthony Waldrop	GHCD	anthony.waldrop@graysharborcd.org
John Geist	DNR	JOHN.GEIST@dnr.wa.gov
Chelsey Buffington	WDFW	Chelsey.Buffington@dfw.wa.gov
Megan Bungum	WDFW	megan.bungum@dfw.wa.gov
Kaitlyn Estep	WDFW	kaitlyn.estep@dfw.wa.gov



Glossary

- “Hot spots”- These are defined as areas with relatively higher CPUE’s than other sites within the same water body
- Functionally control - Practical means of reducing EGC populations to a level of controlled presence where their numbers are not harming ecological functions

Contributions

- Maps provided by Ron Coleman (DNR), Hannah Robinson (WDFW), Ross Martin (WDFW):
  - North Coastal Sites - Prospective - Google My Maps
  - 2022 Trapping Effort - Google My Maps
  - Coastal EGC Sampling Sites - Google My Maps
- Input from Chelsey Buffington (WDFW), Alex Stote and Emily Grason (Sea Grant), David Buegli (WGHOGA), Ed Darcher (Pacific County), Lizzy Matteri (DNR), Cassidy Johnson (DNR), Ron Coleman (DNR), Birdie Davenport (DNR), Hannah Robinson (WDFW), Kyle Deerkop (Pacific Seafood), and Ross Martin (WDFW)